E72-10175
CR-128412

(E72-10175) PROPOSAL TO EVALUATE THE USE OF ERTS-A IMAGERY IN MAPPING AND MANAGING SOIL AND RANGE RESOURCES IN THE SAND HILLS REGION OF NEBRASKA J.V. Drew (Nebraska Univ.) 31 Oct. 1972 8 p CSCL 08B G3/13

N73-10354

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DATE: October 31, 1972

TO: ERTS Contracting Officer
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NASA Scientific and Technical
Information Facility
Attn: ERTS - Resources
P. O. Box 33
College Park, Maryland 20740

FROM: James V. Drew, Principal Investigator (UN-062)
412 Administration Building
University of Nebraska
Lincoln, Nebraska 68508

RE: Progress Report (Type I)

The following progress report summarizes work accomplished from September 1, 1972 to October 31, 1972 according to Article II, Item 3 of the contract schedule included in contract NAS5-21756.

a. Proposal to evaluate the use of ERTS-A imagery in mapping and managing soil and range resources in the Sand Hills Region of Nebraska (ERTS Proposal Numbe 020)

b. GSFC Identification Number of Principal Investigator: UN-062.

c. Our initial plan for data analysis involved comparisons of color composite imagery from ERTS-1 with ground truth. Initial evaluation of NASA RB-57F aircraft imagery received in early September 1972 revealed that color infrared imagery yielded the most information of value to the investigation. NASA's decision not to provide color composite imagery for the investigation however, necessitated that we obtain equipment to generate our own color composite imagery. This equipment, consisting of a Spectral Data Projector/Viewer, has been ordered, on approval of a request for change in use of funds received July 17, 1972, and should be received about the last week in October. Once operational, the instrument should provide color composite and color enhanced imagery for further evaluation of soil and rangeland patterns in the Sand Hills.

d. Accomplishments during the reporting period: Further field reconnaissance has been conducted along four north-south transects across Test Site 313. Additional documentation utilizing color and color infrared ground photography has been gathered to provide data for late season changes on the selected range sites. Some supplementary site data has also been obtained from cooperating Soil Conservation Service personnel as an aid to first evaluation of aircraft and satellite imagery.

Cooperation with the Great Plains Corridor study, conducted by the Remote Sensing Center, Texas A&M University, has been continued. Ground photography plus forage clipping data has been provided for the later stages of the growing season.

8 p.

In conjunction with the clipping, capacitance meter measurements have been taken as a preliminary evaluation of the meter for site measurements next growing season.

Evaluation of NASA RB-57F imagery has been conducted for differentiation of three categories of range sites and relative agreement between vegetation patterns and existing soils maps. Initially, comparisons have been made using 9in x 9in color infrared imagery. Location of sites on this imagery by legal description and associated ground features, natural as well as man-made, was relatively simple. Visual comparisons were adequate to demonstrate usefulness of the imagery for distinguishing the three categories of range sites.

Comparison of existing soils maps with imagery vegetation patterns was made using the same 9in x 9in color infrared RB-57F imagery. Existing soils maps were reduced photographically to the same scale as the color infrared imagery in the form of a positive transparency. Superimposing of the map transparency over the color infrared imagery allowed visual comparison of the vegetative pattern with the general soils boundaries.

Attempts are currently under way to make a similar soils map - ERTS-1 imagery comparison utilizing the MSS band 5 imagery (1025-16554-5) of the same area covered by NASA RB-57F imagery. Enlargement of the location within the imagery to a magnitude suitable for similar soils map comparisons is presently under way. Comparisons between vegetative pattern and soils boundaries will then be made. Types of range sites possibly may be distinguished in cases of larg differences in density of imagery patterns. More precise comparisons of categories of range sites and soils map-vegetation patterns can be made once color composites or color enhanced images of these areas are available.

Continued study will be made of range site category comparisons to determine how closely one can distinguish condition class within a site category. This will likely necessitate some form of instrumental quantitation of density of site areas on the imagery. Two possible approaches to this quantitation are microdensitometry or density slicing. Continued study of soil map-vegetation pattern similarities will also be made to determine how closely color differences or color tone differences agree with specific soil types. Color enhancement of imagery appears to be a promising technique for this type of study.

e. Significant results: Visual examination of NASA RB-57F color infrared imagery of range sites within Test Site 313 indicate that early season (June 1) imagery will show significant differences in appearance of sub-irrigated sites as compared to dry valley (sandy) sites. Differences appear to be significant also when comparing the previous two sites to sands sites. Not all aspects of condition classes within sites have been examined as to rule out overlap of high condition class in one

site with low condition class of another site when progressing from least productive to most productive sites.

Comparison of existing soil map soils delineations with vegetative growth patterns shows reasonably good agreement between the two patterns over rather broad areas. More study is required to determine how closely the relationship holds for specific soils and specific vegetative pattern. Observable color tone differences on the imagery where ground observation has indicated forage density differences would suggest the probability of distinguishing forage density differences within a given site and possibly between similar sites. Additional ground truth parameters along with forage density will need to be correlated with imagery differences to better understand this aspect of the study.

The ability to distinguish range sites and some relative idea of condition class from imagery would greatly facilitate the development or updating of range management plans by landowners or government service personnel responsible for such plans. Much time is taken when ground observation is the method deriving this information. Since the reliability of making such determinations is not adequately established, it is difficult to arrive at an estimate of cost benefit for these results. Time saved by use of imagery would be highly dependent on amount of ground truth verification necessary to establish an acceptable degree of reliability.

Visual examination of ERTS-1 imagery has also shown that rangeland burned by prairie fire within the last six months can be distinguished. Three confirmed fire areas have been shown on image 1025-16554-7 and one on 1027-17070-7. Since only broad estimates of burned acres are available, more accurate acreage measurements will be attempted. Known acreage of burned areas will be of value to those agencies responsible for deferred grazing payments to land owners. The relative speed with which this acreage information would become available to these agencies through ERTS-imagery would be of much benefit, along with greater probable accuracy and decreased man-hours necessary to obtain the information.

f. Publications: No publications have been prepared as yet from studies conducted under this contract.

g. Recommendations: No recommendations are offered at this time.

h. Changes in standing order forms: Request dated August 31, 1972 was submitted asking that bulk 70mm black and white positive transparencies in RBV bands 1,2 and 3 and MSS bands 4,5,6 and 7 be included in our standing order as well as the 9.5in x 9.5in imagery. The last shipment of ERTS imagery included duplicate 70mm imagery.

i. ERTS image descriptor forms: Enclosed are image descriptor forms to cover all ERTS imagery received between August 31, 1972 and October 31, 1972.

j. Data Request forms for retrospective data: No data request forms for retrospective data have been submitted.

k. Other information: No additional information is available at this time.

cc: Dr. Donald Burzlaff
Dr. David Lewis
Dr. Paul Seevers

October 31, 1972
Article II, Item 3e; Significant results:
Discipline 1. Agriculture/Forestry/Range Resources
Subdiscipline C. Range Survey and Classification

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Article II, Item 3e; Significant results:
Discipline 7. Environment
Subdiscipline L. Disaster surveys and assessments

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ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
D _____
N _____
ID _____

DATE October 31, 1972

PRINCIPAL INVESTIGATOR Dr. J. V. Drew

GSFC UN062

ORGANIZATION University of Nebraska

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Cropland	Lakes	Dunes	
1027-17075-M	x			
1027-17070-M		x		
1009-17073-M	x			
1008-17015-X	x			
1007-16551-R		x		
1025-16551-M		x		
1007-16554-M			x	
1025-16554-M			x	
1007-16560-R	x			
1025-16560-M	x			
1006-16493-M	x			
1024-16493-M	x			
1006-16495-M	x			
1024-16500-M	x			
1006-16502-M	x			
1024-16502-M	x			

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

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GSFC 37-2 (7/72)